

Unit IV

No. of Printed Pages : 04

Roll No.

7. (a) Define first and second countable spaces show that every second countable space is first countable but converse may not be true. 8
- (b) State and prove Lindelof theorem. Also show that converse of Lindelof theorem is not true. 7
8. (a) Show that a top. space X is T_2 iff the closures to distinct point are distinct. 7
- (b) Show that the property of top space being T_2 is both hereditary and topological. 8

FF-344

M. Sc. EXAMINATION, May 2017

(Sixth Semester)

(5 Years Integrated)

(Main & Re-appear)

MAT-418-H

MATHEMATICS

Elementary Topology

Time : 3 Hours]

[Maximum Marks : 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) State and prove cofinite topology. 6
(b) Prove that in a topological space (X, J)
 $\bar{A} = A \cup d(A)$ for any $A \subseteq X$. 9
2. (a) Prove that a family β of sets is a base for a topology for the set $X = \bigcup \{B : B \in \beta\}$ iff for every $B_1, B_2 \in \beta$ and every $x \in B_1 \cap B_2$, $\exists a B \in \beta$ s.t. $x \in B \subseteq B_1 \cap B_2$. 8
(b) State Kuratowski closure axiom and characterise topology in terms of Kuratowski closure operator. 7

Unit II

3. (a) If f is a mapping of a top space X into other top space, then f is continuous on X iff $f[C(E)] \subseteq C^* f(E) \forall E \subseteq X$. 8
(b) Show that a top-space X is connected iff \exists no non-empty proper subset which is both open and closed. 7

4. (a) If f is continuous mapping of $[X, J]$ into (X^*, J^*) , then show that f maps every connected subset of X onto a connected subset of X^* . 7
(b) If f is a one-one mapping of a top-space X onto another top space X^* , then f is a homeomorphism iff $f(i(E)) = i^* f(E)$ for every $E \subseteq X$. 8

Unit III

5. (a) Define a compact set. Show that an infinite set with co-countable topology is not compact. 7
(b) Show that a top space is compact iff any family of closed sets having FIP has a non-empty intersection. 8
6. (a) Define locally compact top space. Show that every compact top space is locally compact. Give an example to show that converse is not true. 5
(b) State and prove one point compactification theorem. 10